

A BANDING STUDY OF CINCINNATI AREA GREAT HORNED OWLS

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ABSTRACT.—From 1964–92, 1570 nestling great horned owls (*Bubo virginianus*) were banded at 906 successful nests within 80 km of Cincinnati, Ohio. One nest contained four young, 40 nests three young, 581 two young, and 284 one young. Mean annual productivity was remarkably constant at 1.7 young per successful nest and 1.3 young per breeding attempt. An average of 15% of breeding pairs failed to raise young and 38% of the pairs did not attempt to nest; the number of young per occupied territory was variable but averaged 0.80 young. From 1236 nesting attempts, 533 occurred in nests built in previous years by red-tailed hawks (*Buteo jamaicensis*), 527 were in broken-off snags, and 125 were on man-made platforms. Most band recoveries occurred within the 80-km radius study area but six dead owls were found in Michigan as old as nine years of age.

KEY WORDS: *Bubo virginianus*; bird banding; breeding success; brood size; nest sites; unhatched eggs; Ohio; Kentucky; Indiana.

Estudio de marcaje de *Bubo virginianus* en el área de Cincinnati

RESUMEN.—Desde 1964 a 1992, 1570 polluelos de *Bubo virginianus* fueron marcados en 906 nidos exitosos a 80 km de Cincinnati, Ohio. Un nido tuvo cuatro juveniles, 40 nidos tres juveniles, 581 dos juveniles y 284 un juvenil. La productividad media anual fue marcadamente constante de 1.7 juveniles por nido exitoso y 1.3 juveniles por pareja reproductiva. Un promedio de 15% de parejas reproductivas falló en criar juveniles, el 38% no intentó reproducirse; el número de juveniles por territorio ocupado fue variable pero en promedio era de 0.80. De 1236 intentos reproductivos, 533 ocurrieron en nidos construidos en años previos por *Buteo jamaicensis*, 527 fueron en ramas quebradas y 125 fueron construidos sobre plataformas artificiales.

[Traducción de Ivan Lazo]

I studied nest-site selection and reproductive success of great horned owls (*Bubo virginianus*) within an 80-km radius of Cincinnati, Ohio from 1964–92. Here, I report the results of this lifelong study.

STUDY AREA AND METHODS

Most of the 20 000 km² study area was in Ohio and ranged from hilly, wooded areas to moderately settled river bottoms of the Ohio River and its tributaries, and from urban and suburban backyards, parks, cemeteries and golf courses, to fairly flat and sparsely wooded areas to the north and west of the city. The Indiana portion was hilly and heavily wooded to the south, changing to flat and sparsely settled agricultural areas to the north. The Kentucky segment was hilly throughout and ranged from heavily wooded in the north to sparsely wooded areas in the south.

The most intensive nest searching and banding occurred from 1964–77. From 1980–92, I covered only the parks of the Hamilton County Park District with a total area of 49.8 km². My experiences during the first two years of this study were described in Austing and Holt (1966).

I classified a breeding attempt by a horned owl “successful” if one or more young survived to banding age, or “failed” if incubation was begun but no young were produced. A territory was considered to be “occupied” if a pair of horned owls was present, regardless of their breeding status.

RESULTS AND DISCUSSION

I climbed into 1236 nests from 1964–92 and banded 1570 nestling great horned owls in 906 successful nests; 1193 were banded in Ohio, 324 in Indiana, and 53 in Kentucky (Table 1). More than half of the owlets were banded before they were three weeks of age. Of 1777 instances where owls occupied territories, 841 (47.3%) bred successfully, 266 failed (15%), and 670 (37.7%) made no attempt to breed (Table 2).

I found a total of 97 unhatched eggs or 5.8% of the 1667 eggs observed. Seventy-six of these were in nests that contained no young, 19 in nests with one young, and two were in nests with two young.

The Ratcliffe eggshell thickness index (Ratcliffe 1967) was determined in 1969 for 18 unhatched eggs collected in 13 nests and averaged 1.822 (Range = 1.442–2.274). This average was 8% thinner than the index of 2.01 for pre-1947 eggs from the Midwest (Anderson and Hickey 1972).

Brood size at the time of banding in 802 nests was: one young in 248 (31%) nests, two young in 515 (64%) nests, three young in 38 (5%) nests, and four young in one (0.1%) nest (Table 2). There was an attrition of 101 (6.7%) young owlets which died or disappeared prior to banding visits. The only brood of four young was encountered in 1970 when productivity reached an all-time peak. In that year, there were eight broods of three, over twice the norm, in what was called "the year of the rat." Norway rats (*Rattus norvegicus*) were almost everywhere, either killed on roads, scurrying around in cornfields and farm buildings, or even out in broad daylight. Owl nests had as many as six rats piled in them. In other years, three or four rats would have been an expected number found among prey remains in an entire nesting season.

Mean productivity per successful nest was remarkably constant throughout the study at 1.7 young per successful nest (Table 2), roughly equivalent to the success of great horned owls in Saskatchewan after a population crash of snowshoe hares (*Lepus americanus*), but far below the 2.5–2.6 young per successful nest at the peak of the hare cycle (Houston 1987, Houston and Francis 1995). The number of young per occupied territory varied considerably between years but averaged 0.80, excluding from this calculation 39 successful nests in which young were found too late to be banded. This productivity was well below the 1.47 young per nesting attempt suggested by Henny (1972) as necessary to maintain a stable population, but these calculations based on early banding recoveries may have overestimated annual adult mortality (Houston and Francis 1995). The number of young per occupied territory varied considerably by year with the number of pairs reaching a peak in 1970, the year of highest prey abundance.

Of 1236 breeding attempts, 585 pairs used nests built in previous years by other birds or mammals; 533 used nests built by red-tailed hawks (*Buteo jamaicensis*) and almost an equal number (527) made use of hollows, broken-off snags and rotted-out cavities in overmature beech (*Fagus* spp.) and maple (*Acer* spp.) trees. Artificial platforms which I constructed were used 125 times and owls nested once

Table 1. Numbers of nestling great horned owls banded near Cincinnati, Ohio from 1964–92.

YEAR	OHIO	INDIANA	KENTUCKY	TOTAL
1964	42	15		57
1965	51	14		65
1966	37	8		45
1967	51	13		64
1968	62	17	2	81
1969	84	31	1	116
1970	106	27	3	136
1971	68	17	1	86
1972	115	35	4	154
1973	87	20	9	116
1974	87	34	5	126
1975	59	13	8	80
1976	110	40	6	156
1977	77	26	11	114
1978	12	3	3	18
1979	0	0	0	0
1980	12			12
1981	25			25
1982	2			2
1983	9			9
1984	8			8
1985	10	3		13
1986	9	5		14
1987	12			12
1988	13	2		15
1989	12			12
1990	14	1		15
1991	10			10
1992	9			9
Total	1193	324	53	1570

in the hayloft of a barn (Table 3). Many pairs re-nested in the same territory for two or more years. Of 21 territories observed for 15 years, two were occupied by pairs of breeding great horned owls for 14 years and another two were occupied for 13 years. A total of 54 territories were used for only one year.

Owls began nesting the second week of January and continued until the first week of March. Of 903 broods which could be back-dated, 519 were initiated in January, 379 in February, and only 5 in March. Of these, 329 were initiated during the last 10 days of January and 222 were initiated in the first week of February. Early breeding pairs tended to reoccupy known sites and to raise more young than pairs that nested later. Some of the later nests may have been re-nesting attempts.

A total of 151 banded great horned owls were

Table 2. Brood size and productivity of great horned owl nests near Cincinnati, Ohio from 1964-92.

YEAR	BROOD SIZE				TOTAL NESTS	TOTAL YOUNG BANDED	TOTAL SUCCESSFUL NESTS	TOTAL OCCUPIED NESTS
	1 yg.	2 yg.	3 yg.	4 yg.				
1964	15	18	2		35	57	1.6	1.14
1965	12	25	1		38	65	1.7	0.88
1966	8	17	1		26	45	1.7	0.63
1967	17	22	1		40	64	1.6	0.71
1968	17	29	2		48	81	1.7	0.75
1969	11	48	3		62	116	1.9	0.96
1970	18	45	8	1	72	136	1.9	1.12
1971	17	30	3		50	86	1.7	0.67
1972	23	61	3		87	154	1.8	0.99
1973	24	40	4		68	116	1.7	0.70
1974	21	48	3		72	126	1.8	0.80
1975	12	34			46	80	1.7	0.51
1976	23	59	5		87	156	1.8	0.94
1977	30	39	2		71	114	1.6	0.66
1978	6	9			12	18	1.5	
1980-92	30	60	2		90	156	1.7	
Total	284	584	40	1	906	1570	1.7	

recovered dead. About 42% (64) were reported as code "00" or found dead, another 15 were "04" or caught in traps (five of which were caught in illegal pole traps and destroyed), 14 were "14" and "45" or killed on highways, 10 were code "01" or shot, six were captured alive and released, five were captured and kept in captivity, and the status of four was uncertain. Owls were found dead throughout the year and only 16 were found dead during the fall hunting season. None of the owls reported shot were shot during the hunting season. A farmer shot both nestling owls I banded on his property because they sat on his barn roof at

night and kept him awake with their food begging. Another farmer did likewise claiming that the owls were bothering his pigs.

Due to the nonmigratory nature of these great horned owls, most (141 of 151) were recovered dead within the 80-km radius of the study area. Six recoveries were of special interest; all were reported from Michigan and two of the owls were 1-yr old, two were 2-yr old, one was 6-yr old and one was 9-yr of age.

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Table 3. Nests used by great horned owls near Cincinnati, Ohio from 1964-92.

	NUMBER OF YEARS USED									TOTAL NESTS	TOTAL NEST- LINGS
	1	2	3	4	5	6	7	8	9		
Red-tailed hawk ^a	263	77	24	6	1		1	1		373	533
Cavity/snag	136	63	29	18	6	5	3	2	1	263	527
Platform	22	9	11	4	6	1				53	125
E. fox squirrel ^b	17	1								18	19
American crow ^c	13									13	13
Red-shouldered hawk ^d	11									11	11
Cooper's hawk ^e	5									5	5
Green heron ^f	1									1	1
Barn loft		1								1	2

^a *Buteo jamaicensis*; ^b *Sciurus niger*; ^c *Corvus brachyrhynchos*; ^d *Buteo lineatus*; ^e *Accipiter cooperii*; ^f *Butorides striatus*.

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LITERATURE CITED

- ANDERSON, D.W. AND J.J. HICKEY. 1972. Eggshell changes in certain North American birds. *Proc. Int. Ornithol. Congr.* 15:514-540.
- AUSTING, G.R. AND J.B. HOLT, JR. 1966. The world of the great horned owl. J.B. Lippincott, Philadelphia, PA U.S.A.
- HENNY, C.J. 1972. Great horned owl. Pp. 11-16 in An analysis of the population dynamics of selected avian species with special reference to changes during the modern pesticide era. Wildlife Research Report 1, U.S. Fish and Wildlife Service, Washington, DC U.S.A.
- HOUSTON, C.S. 1987. Nearly synchronous cycles of the great horned owl and snowshoe hare in Saskatchewan. Pp. 56-58 in R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre [Eds.], *Biology and conservation of northern forest owls: symposium proceedings*. Gen. Tech. Rep. RM-142, U.S. Dept. Agric., Forest Service, Fort Collins, CO U.S.A.
- HOUSTON, C.S. AND C.M. FRANCIS. 1995. Survival of great horned owls in relation to the snowshoe hare cycle. *Auk* 112:44-59.
- RATCLIFFE, D.A. 1967. Decrease in eggshell weight in certain birds of prey. *Nature* 215:208-210.

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